CLAIMS

1. In a multidimensional digital frame structure, a method for variably programming the value of frame synchronization bytes, the method comprising:

defining a frame with an overhead section having a predetermined number of bytes; and

selecting the values of the bytes in the overhead section to be used for frame synchronization.

2. The method of claim 1 wherein defining the frame includes defining the overhead section having a first plurality of overhead byte locations; and

wherein selecting the value of the frame synchronization bytes in the overhead section includes selecting values in the range from zero to a first plurality of byte values.

3. The method of claim 2 wherein defining a frame includes defining each frame synchronization byte having a second plurality of bits; and

wherein selecting the value of the frame synchronization bytes includes selecting a second plurality of bits for each frame synchronization byte.

4. The method of claim 3 wherein selecting the value of frame synchronization bytes in the overhead section includes selecting a plurality of frame synchronization byte values.

5. The method of claim 4 wherein selecting frame synchronization byte values includes selecting frame synchronization bytes having a first value and frame synchronization bytes having a second value.

6. The method of claim 2 further comprising:

selecting the quantity of bytes in the overhead section to be used for frame synchronization.

7. The method of claim 6 wherein defining the frame includes defining the overhead section having a first plurality of bytes;

wherein selecting the quantity of bytes in the overhead section includes selecting a first number of bytes in the range from zero to the first plurality of bytes; and

wherein selecting the value of the frame synchronization bytes in the overhead section includes selecting a first number of byte values.

8. The method of claim 2 further comprising:

defining a superframe structure with a predetermined number of frames per superframe; and

wherein selecting the values of frame synchronization bytes in the overhead section includes selecting the values of bytes in the overhead section of each frame.

9. The method of claim 8 wherein defining a superframe structure with a predetermined number of frames per superframe includes defining a first and a second frame in the superframe; and

wherein selecting the values of frame synchronization bytes in the overhead section includes selecting a first byte value in the first frame and a second byte value in the second frame.

10. The method of claim 9 wherein defining a superframe structure with a predetermined number of frames per superframe includes defining a superframe with a first, second, third, and fourth frame; and

wherein selecting the values of frame synchronization bytes in the overhead section includes selecting a first byte value in the first frame, a second byte value in the second frame, a third byte value in the third frame, and a fourth byte value in the fourth frame.

11. The method of claim 10 wherein selecting the values of frame synchronization bytes in the overhead section includes selecting a value of zero in the second, third, and fourth frames.

12. The method of claim 2 further comprising:

selecting the bit error rate of the frame synchronization byte values.

13. The method of claim 12 wherein selecting a frame synchronization byte bit error rate includes selecting an average bit error rate for the selected frame synchronization byte values.

14. The method of claim 12 wherein selecting the frame synchronization byte values includes selecting a frame synchronization value with a selected bit error rate.

15. The method of claim 2 further comprising:

selecting the location of the frame synchronization bytes in the overhead section.

16. The method of claim 15 wherein selecting the location of frame synchronization byte includes selecting frame synchronization bytes having a first value, in a first location, and frame synchronization bytes having a second value, in a second location.

17. The method of claim 15 wherein selecting the frame synchronization byte includes selecting a first frame synchronization byte value at a first location.

18. A method for variably programming the value of frame synchronization bytes in the communication of a multidimensional digital frame structure, the method comprising:

selecting the values of frame synchronization bytes in the overhead section of a transmitted frame;

sending the frame;

receiving the frame; and

synchronizing the received frame in response to recognizing the frame synchronization bytes.

19. The method of claim 18 further comprising:

selecting the values of the frame synchronization bytes in the overhead section of the received frames; and

wherein synchronizing the received frames in response to recognizing the frame synchronization bytes includes synchronizing received frames in response to recognizing the synchronization byte values in the received frames.

20. The method of claim 19 wherein selecting the frame synchronization byte values in the received frame includes selecting a first frame synchronization byte value; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to recognizing the first frame synchronization byte value.

21. The method of claim 19 further comprising:

selecting the number of consecutive frames with recognized frame synchronization bytes; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the

received frame in response recognizing the selected frame synchronization byte values in the selected number of consecutive frames.

22. The method of claim 19 further comprising:

selecting the location of the frame synchronization byte values in a transmitted frame.

23. The method of claim 22 further comprising:

selecting the location of frame synchronization byte values in the received frame.

24. The method of claim 23 wherein selecting the location of the frame synchronization byte values in a transmitted frame includes selecting first locations for a first byte value, and second locations for a second byte value; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to recognizing the first frame synchronization byte values in the first locations and the second byte values in the second locations.

25. The method of claim 23 wherein selecting the location of frame synchronization byte values in the overhead section of a transmitted frame includes selecting first frame synchronization byte values in first locations; and

wherein selecting the location of the bytes to be used for frame synchronization of the received frame includes selecting the first frame synchronization byte values in the first locations.

26. The method of claim 23 wherein selecting the locations of frame synchronization byte values in the overhead section of a transmitted frame includes selecting a first frame synchronization byte value in a first number of locations;

wherein selecting the location of the frame synchronization byte values in the received frame includes selecting the first frame synchronization byte value in a second number of locations, less than the first number; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to recognizing the first frame synchronization byte value in the second number of locations.

27. The method of claim 19 further comprising:

selecting the bit error rate of the frame synchronization byte values.

28. The method of claim 27 wherein selecting a bit error rate includes selecting an average bit error rate for the selected frame synchronization byte values.

29. The method of claim 27 wherein synchronizing the received frame in response to recognizing the frame synchronization byte values includes recognizing frame synchronization byte values having a bit error rate less than, or equal to, the selected frame synchronization bit error rates.

30. The method of claim 19 further comprising:

defining a superframe structure with a predetermined number of frames per superframe; and

wherein selecting the values of frame synchronization bytes in the overhead section of a transmitted frame includes selecting byte values to be used for synchronization in the overhead section of each frame of the superframe;

wherein sending the frame includes sending frames in the superframe structure; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes recognizing frame synchronization byte values in each frame of the superframe.

31. The method of claim 30 further comprising:

selecting the quantity of frame synchronization byte values in the overhead section of the received frame.

32. The method of claim 31 wherein selecting the quantity of frame synchronization byte values in a received frame includes selecting a quantity of byte values for each frame of the superframe; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes recognizing the selected quantity of frame synchronization byte values in each frame of the superframe.

33. The method of claim 32 wherein selecting the quantity of frame synchronization byte values includes selecting a first number of frame synchronization byte values in a first frame; and

wherein synchronizing the received frame in response to recognizing frame synchronization bytes includes recognizing the first number of frame synchronization byte values in the first frame.

34. The method of claim 32 wherein selecting the quantity of each frame synchronization byte values in the received frame includes selecting a first number of frame synchronization bytes having a first value, and a second number of frame synchronization bytes having a second value; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to recognizing the first number of frame synchronization bytes having the first value, and the second number of frame synchronization bytes having the second value.

35. The method of claim 32 further comprising:

selecting the quantity of frame synchronization bytes in the overhead section of a transmitted frame.

36. The method of claim 35 wherein selecting the quantity of the frame synchronization byte values in the transmitted frame includes selecting a first number of fame synchronization bytes having a first value, and a second number of frame synchronization bytes having a second value;

wherein selecting the quantity of frame synchronization bytes in the received frame includes selecting a third number of frame synchronization bytes, less than the first number, having the first value, and a fourth number of frame synchronization bytes, less than the second number, having the second value; and

wherein synchronizing the received frame in response to recognizing the frame synchronization bytes includes synchronizing the received frame in response to recognizing the third number of frame synchronization bytes having the first value, and the fourth number of frame synchronization bytes having the second value.

37. The method of claim 19 further comprising:

selecting a number of consecutive received frames in which frame synchronization bytes values are not recognized; and

falling out of synchronization in response to not recognizing frame synchronization bytes values in the selected number of received frames.

38. In a multidimensional digital frame structure, a transmitter system for variably programming the value of frame synchronization bytes, the system comprising:

a frame generator including an overhead generator to generate the overhead section of a frame, a payload generator to generate the payload section of the frame, and an encoder to provide forward error correction (FEC) for the frame; and

wherein the overhead generator includes an input to select the value of frame synchronization bytes in the overhead section.

39. The system of claim 38 wherein the frame generator supplies a frame with a first plurality of overhead bytes; and

wherein the overhead generator accepts commands to select frame synchronization byte values in the range from zero to the first plurality, for each frame.

40. The system of claim 39 wherein the overhead generator selects a second plurality of bits for each frame synchronization byte value, where each byte includes the second plurality of bits.

41. The system of claim 40 wherein the overhead generator selects frame synchronization byte values from a plurality of byte values.

42. The system of claim 38 wherein the frame generator forms a superframe structure with a predetermined number of frames per superframe; and

wherein the overhead generator selects frame synchronization byte values for the overhead section of each frame of the superframe.

43. The system of claim 42 wherein the overhead generator selects a quantity of frame synchronization bytes values in the overhead section.

44. The system of claim 43 wherein the frame generator forms a superframe with a first and a second frame; and

wherein the overhead generator supplies a first number of selected frame synchronization byte values for the first frame and a second number of frame synchronization byte values for the second frame.

45. The system of claim 38 wherein the overhead generator selects the location of frame synchronization byte values in the overhead section.

46. The system of claim 45 wherein the overhead generator selects first frame synchronization byte values in a first location, and second frame synchronization byte values in a second location.

47. In a multidimensional digital frame structure, a receiver system for variably programming the value of frame synchronization bytes, the system comprising:

a frame receiver including an overhead receiver to receive the overhead section of a frame, a payload receiver to receive the payload section of the frame, and a decoder to provide a forward error corrected (FEC) frame; and

wherein the overhead receiver includes an input to select the value of frame synchronization bytes in the overhead section.

48. The system of claim 47 wherein the overhead receiver selects a second plurality of bits for each frame synchronization byte value, where each byte includes a second plurality of bits.

49. The system of claim 48 wherein the overhead receiver selects frame synchronization byte values from a plurality of byte values.

50. The system of claim 49 wherein the frame receiver supplies a frame with a first plurality of overhead section bytes; and

wherein the overhead receiver selects frame synchronization byte values, in each frame, in the range from zero to a first plurality of byte values.

51. The system of claim 50 wherein the overhead receiver selects first frame synchronization bytes having a first value, and second frame synchronization bytes having a second value.

52. The system of claim 47 wherein the frame receiver supplies a frame with a first plurality of overhead section bytes; and

wherein the overhead receiver accepts commands to select frame synchronization byte values in the range from zero to the first plurality.

53. The system of claim 47 wherein the frame receiver forms a superframe structure with a predetermined number of frames per superframe; and

wherein the overhead receiver selects the values of frame synchronization bytes required for the recognition of a received frame from the overhead section of each frame of the superframe.

54. The system of claim 53 wherein the overhead receiver selects the quantity of frame synchronization bytes in the overhead section.

55. The system of claim 54 wherein the frame receiver forms a superframe with a first and a second frame; and

wherein the overhead receiver selects first frame synchronization byte values in the first frame and second frame synchronization byte values in the second frame.

56. The system of claim 47 wherein the overhead receiver selects the bit error rate required for the recognition of each selected frame synchronization byte value.

57. The system of claim 56 wherein the overhead receiver selects an average bit error rate for the selected frame synchronization byte values.

58. The system of claim 47 wherein the overhead receiver selects locations for the frame synchronization byte values.

59. The system of claim 58 wherein the overhead receiver selects first byte locations for first frame synchronization byte values.

60. The system of claim 59 wherein the overhead receiver accepts commands to select a first number of byte locations for a first number of frame synchronization byte values in a first frame, and a second number of byte locations for a second number of frame synchronization byte values in a second frame.

61. The system of claim 47 wherein the overhead receiver selects a number of consecutive frames in which frame synchronization byte values must be recognized for the received frames to be synchronized.

62. The system of claim 47 wherein the overhead receiver selects a number of consecutive frames in which frame synchronization byte values are not recognized for the received frames to fall out of synchronization.

63. A system for variably programming the value of frame synchronization bytes in the communication of a multidimensional digital frame structure, the system comprising:

a transmitter with a frame generator including an overhead generator having an input to accept commands for selecting the value of frame synchronization bytes in the overhead section of a transmitted frame; and

a receiver with a frame receiver including an overhead receiver having an input to accept commands for selecting the value of frame synchronization bytes required for synchronizing the received frame, the overhead receiver synchronizing the frame in response to recognizing the frame synchronization byte values.